the average depth at which observations were taken, is given in the table on the left-hand side of Chart No. III. Owing to ice and breakage of instruments, observations are wanting as follows: Alpena, Burlington, Buffalo, Chicago, Cleveland, Detroit, Duluth, Escanaba, Grand Haven, Milwaukee, Marquette, Sandusky and Toledo, from 1st to 28th; Mobile, 19th to 28th: Delaware Breakwater, 2nd to 8th; San Francisco, 3rd to 28th; Punta Rassa, 18th to 28th.

ATMOSPHERIC ELECTRICITY.

Thunder storms.—In the various districts they were reported on the following dates: New England, 12th, 28th; Middle Atlantic States, 5th, 12th, 19th, 25th, 26th, 27th, 28th; South Atlantic States, 11th, 16th to 19th, 21st, 22nd, 23rd, 27th, 28th; Eastern Gulf States, 6th, 7th, 9th, 11th, 18th, 19th, 25th, 26th, 27th, 28th; Western Gulf States, including Texas, 5th, 6th, 8th, 9th, 10th, 11th. 15th, 16th, 17th, 18th, 19th, 20th, 26th; Ohio valley and Tennessee, 9th, 11th, 18th, 19th, 26th, 27th, 28th; Upper Lake region, 26th; Upper Mississirpi valley, 17th, 20th, 26th, 27th, 28th; Lower Missouri valley, 5th, 6th, 19th, 20th, 26th, 27th; Arizona, 5th, 6th, 17th; California, 3rd, 15th, 16th. The most important storm of the month, except along the West Gulf coast from 6th to 9th, began in the Lower Missouri valley on the 26th, accompanying low area No. X, and as it passed eastward spread over the entire country from the lakes to the Gulf, reaching the Atlantic coast on the 27th and 28th, where it was experienced from Havana, Cuba, northeastward to Maine. Storms of this class, gradually increasing in number and severity on the approach of spring, have been less frequent in the northern and more frequent in the southern sections of the country than during the month of February, 1880. As compared with the same month of previous years since 1873, the largest number were reported during February, 1881, the next largest in February, 1878, while in 1879 the number fellto near the minimum which occurred in 1875. It is very interesting, and still further there would seem to be an accordance with supposed laws of periodicity in connection with the recurrence of these storms from season to season, to note that in a comparative study of the month of February for the past nine years, it is found as an invariable feature, that about four-fifths of all the thunder-storms occurred between the 15th and 28th.

Auroras.—There were no remarkably brilliant displays during the month, but rather an unusual number were reported as having been witnessed over that portion of territory common to auroral manifestations, reaching from Maine westward to the 105th meridian. Displays of this nature were observed on the following dates: 1st, from stations in Nebraska northward to the northern boundary of the United States and in northern New England; 2nd, from Kansas northward to British America, and from Virginia northeastward to Maine; 20th, from Montana eastward to Lake Michigan and over New England. 26th, throughout Dakota and Minnesota, and in New Hampshire. 27th, from southern Kansas northwestward to Montana, northward to the northern boundary of Lake Superior and over New England. On all of these dates, and particularly the last three, extreme cloudiness prevailed over the Lower Lake region, preventing any display of auroras, even if they had occurred. From various stations local displays were witnessed on the following dates: Ft. Stevenson, Dak., 28th, a. m.; Spiritwood, Dak., 22nd, p. m.; St. Vincent, Minn., 16th, 20th, 22nd, p. m.; Duluth, 23rd, p. m.; Oswego, N. Y., 5th, a. m.; Burlington, Vt., 3rd, midnight to 12.15 a. m.; 3rd, 4.20 a. m. to daybreak; 6th, 2 a. m. to daybreak; 19th, 11.15 p. m. to midnight; Bangor, Me., 5th, p. m.; Eastport, 7th, 1 a. m. to 3 a. m.; Cambridge, Mass., 19th, 11 p. m.; Newburyport, Mass., 7th, 5 a. m.; 19th, p. m.; Gardiner, Me., 25th, midnight to 4 a. m.

Zodiacal Light.—Waterburg, N. Y., 19th, 21st; Flemington, W. Va., 9th; Bellefontaine, O., 19th; Clear Creek, Neb., 8th, 15th, 16th, 20th, 23rd to 27th; Somerset, Mass., 17th, 19th, 20th, 22nd to 25th; Cambridge, Mass., 15th, 16th, 17th, 19th, 22nd to 25th; Yates Center, Kan., 15th, 20th, 22nd, 23rd, 24th, 25th, 27th, 28th; Monticello, Ia., 21st, 22nd, 23rd; New Corydon, Ind., 16th, 19th, 21st, 23rd, 25th; St. Vincent, Minn., 15th, 16th, 17th, 20th, 24th; Springfield, Ill., 16th.

OPTICAL PHENOMENA.

Polar Bands.—New Corydon, Ind., 17th, 21st, 25th; Yosemite valley, Cal., 14th; Clinton, Ia., 19th; Yates Center, Kan., 1st, 7th, 19th, 20th; Gardiner, Me., 8th, 15th, 20th; Auburn, N. H., 11th, 15th, 20th, 27th; Freehold, N. J., 7th; Vineland, N. J., 7th; Wytheville, Va., 6th, 20th, 25th; Prescott, Ariz., 8th; Little Rock, 1st; Chicago, 4th.

Mirage.—Corpus Christi, Tex., 18th, 1:35 p. m., Mustang Island plainly visible, although at a distance of 18 miles. Genoa, Nebr., 1st, 21st, 27th, 28th. Albuquerpue, N. M., 16th. Indianola, 8th, 11th, 12th, 28th. Escanaba, 3rd, 4th.

Halos have been observed throughout the various districts with the usual frequency common to the winter months. Solar halos, accompanied with from two to four mock suns, were repeatedly witnessed at stations in the Rocky Mountain region, along the Eastern Slope and thence northeastward to the Upper Lake region. The most notable displays were reported from Denver and summit of Pike's Peak on the 14th, and from Menominee, Mich., on the 19th, the latter attended by five mock suns and a parhelic circle of 22° radius, was the most brilliant one of the month. Lunar

halos, with four mock moons, presenting a display of remarkable brilliancy and great perfection, were observed between 9 and 10 p. m. on the night of the 14th in central Coloroado, the stations of Pike's Peak, Denver and Colorado Springs having opportunity for complete observations. From Denver two paraselenæ were observed at points where the parhelic circle cut the halo of 22° radius and two where the intersection would have taken place if there had been present a halo of 90° radius; at a point about 85° above the horizon there appeared a brilliant inverted rainbow arch in the position where a halo of 46° radius would have passed.

MISCELLANEOUS PHENOMENA.

Earthquakes.—Salinas City., Cal., 2nd, (no time given,) motion from north to south; pendant bodies freely vibrated. Visalia, Cal., 1st, 4:11 p. m., three shocks in rapid succession, lasting altogether about two seconds; motion southeast to northwest; 9:53 p. m., another rapid succession of shocks, two in number, and continuing for about two seconds; vibrating motion from south east to northwest; force displayed less severe than former.

Meteors.—Mt. St. Helena, Cal., 11th, 7:30 p. m., very brilliant; course NE. to SW.; upon exploding produced a loud report, which was experienced for several miles around. San Francisco, 2nd, 9:45 p. m., very large and brilliant; passed over city to the northeast; color pale green. Deadwood, 19th, 11 p. m., very brilliant; course SE. to NW.; 27th, 11 p. m., course E. to W.; exploded with fragments like a rocket.

Sunsets.—The characteristics of the sky at sunset as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service Stations. Reports from 174 stations show 4,846 observations to have been made, of which 22 were reported doubtful; of the remainder, 4,097 or 84.9 per cent. were followed by the expected weather.

Sun Spots.—The following record of observations, made by Mr. D. P. Todd, Assistant, has been forwarded by Prof. S Newcomb, U. S. Navy, Superintendent Nautical Almanac Office, Washington, D. C.:

DATE—Feb., 1881.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		REMARKS.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
2, 10 a. m.	0	5	0	10	0	5	5	35†	
3, 9 a. m.	0	0	0	10	0	0	4	25†	
4, 9 m.	0	0	0	10	0	10	4	25†	Faculæ.
5, 9 a. m.	0	5	2	5	0	5	2	25†	Faculæ.
6, 10 a. m.	2	15	0	0	1	4	4	40†	Faculæ.
7, 1 p. m.	0	0	0	0	0	0	4	40†	
10, 3 p. m.	0	0	1	20†	0	0	3	15†	Spots probably disappeared by solar rotation.
11, 8 a. m.	1	3	0	3	0	0	4	15	Faculæ.
12, 10 a. m.	0	0	1	5	0	0	3	10	
13, 9 a. m.	0	0	0	0	0	0	3	10	Faculæ.
14, 9 a. m.	2	4	1	2	2	4	4	12	Faculæ.
15, 9 a. m.	2	5	0	0	0	0	6	17†	Faculæ.
16, 8 a. m.	0	5	0	0	0	0	6	20†	Broad areas of faculæ.
4 p. m.	0	0	0	0	0	0	6	20†	Broad areas of faculæ.
17, 9 a. m.	1	5	0	0	0	0	6	25†	Faculæ. Two of the spots very large.
19, 4 p. m.	2	8	2	20†	2	8	6	13	Faculæ. Two of the spots very large.
20, 10 a. m.	1	10	1	1	0	0	6	22	Faculæ. Two of the spots very large.
2 p. m.	0	0	0	0	0	0	6	22	Faculæ. Two of the spots very large.
23, 8 a. m.	2	6	3	12	1	2	5	12	Faculæ. Spots probably disappeared by solar rotation.
25, 5 p. m.	0	0	0	0	0	0	5	10	
26, 9 a. m.	0	0	1	1	0	0	4	8	Faculæ.

† Approximated.

Mr. William Dawson, at Spiceland, Ind., reports: 2nd, three groups and about 25 spots; large spot at east edge and another at west edge. 13th, two large spots close together, midway between centre and west edge. 15th, six groups, 24 spots; faculæ at east side; air very good. 17th, six groups, 26 spots; large spot close to east edge. 19th, four groups, 9 spots; air poor; 21st, six groups, 23 spots, one large, 11 others quite prominent. 22nd, six groups, 45 spots; one very large spot alone in the SW. quadrant; best air for many weeks. 25th, five groups, 16 spots; new group and faculæ at east edge; faculæ at west edge; air middling good.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports: saw sunspots every day except on the 4th, 6th, 8th to 10th, 12th, 13th, 18th, 20th, 27th and 28th, when it was too cloudy for observation.

NOTES AND EXTRACTS.

[From the Popular Science Monthly, March, 1881.]

Climatology of Europe.—The climate of Western Europe is ameliorated by the warmth of the Gulf Stream in winter, and by the neighborhood of the ocean in summer. In Eastern Europe these modifying influences cease to be felt, and the climate gradually assumes a continental character, with greater differences of temperature, colder winters and warmer summers. The differences in the summer temperatures of the eastern and western regions are less marked than those in the winter temperatures, and amount at most to about 27°. For the greater part of the continent the